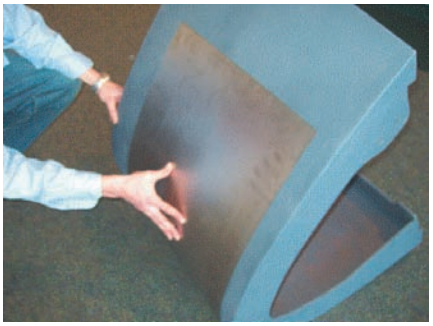
National Aeronautics and Space Administration
Glenn Research Center

Return To Flight

Summary of Return To Flight Efforts

Ballistics Impact Testing

- Assess impact damage threat from debris on orbiter surfaces
- Extensive spectrum of test programs on Return to Flight critical path



Application of a refractory metal sheet over a mockup of Space Shuttle panel 9.

Main Landing Gear Door Environmental Seals

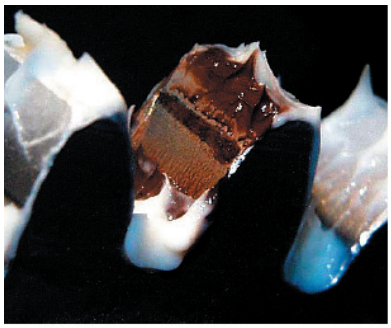
- Identified minimum amount of seal compression required to meet seal leakage goals
- Determined compression levels at which seal loads could become too high

Refractory Metal Overwrap Concept

- Potential method for on-orbit repair of orbiter leading-edge damage
- Flexible, robust, and includable in a "repair kit" (see photo at right)

Actuator Gear Tests

- Determine nature of wear and fretting damage and effect on gear tooth strength
- Life and reliability of the actuators for rudder speed brake being evaluated



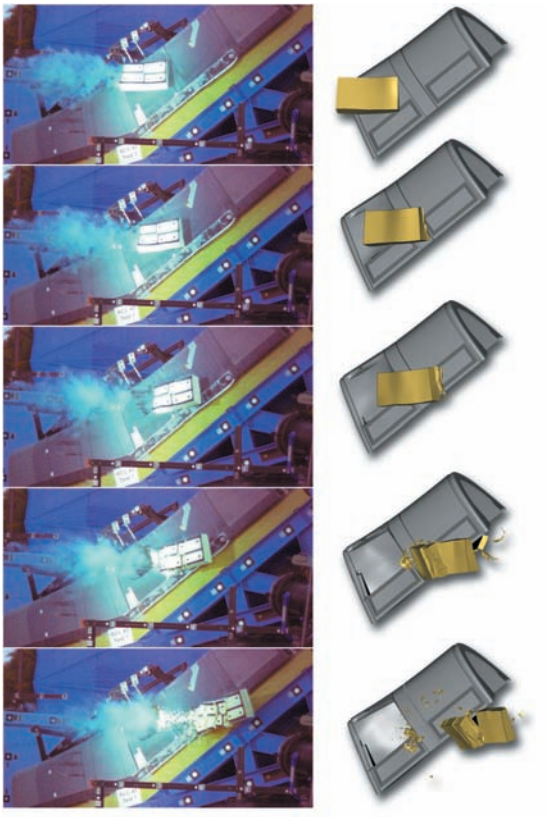
GRC test gears showing wear and fretting damage.

Reinforced Carbon-Carbon (RCC) Degradation

- Critical material for wing leading edge and nose cap
- Study of RCC material to gain deeper understanding of how it degrades with each mission cycle and impact on safe mission limits

Glenn Adhesive Refractory for Bonding and Exterior Repair

- Potential multi-use capabilities for in-space repair of cracks in RCC leading-edge material
- Had been considered for the Return to Flight program and continues as part of ongoing research development



High-speed digital images taken from the full-scale wing leading-edge tests.

Protuberance Air Load (PAL) Ramps Air Flow

- Portions of PAL foam had come off in previous flights
- Wind tunnel tests resulted in better understanding of flow fields over external tank and the loads on the cable tray